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THE CONTRIBUTION MADE BY PIAGET TO KNOWLEDGE OF THE DEVELOPMENT OF CHILDREN IS SUMMARIZED. PIAGET'S INFLUENCE ON BERLYNE AND OTHER PSYCHOLOGISTS, THE RESEARCH METHODS USED BY PIAGET, AND THE CONCEPTS HE FORMULATED ARE BRIEFLY DESCRIBED. THE GOAL OF HIS RESEARCH CONDUCTED AT GENEVA IS IDENTIFIED AS THE DISCOVERY OF THE SUCCESSIVE STAGES IN THE DEVELOPMENT OF INTELLIGENCE. THE AUTHORS FIND THAT PIAGET DESCRIBES THESE STAGES AS OCCURRING IN CONSTANT, INVARIANT SEQUENCE BUT WITH NO TIME BOUNDARIES IN CONTRAST WITH THE GESELLIAN VIEW THAT STAGES HAVE FIRM UPPER AND LOWER TIME LIMITS. THE AUTHORS STATE THAT THE MATURATIONIST VIEW OF FIXED INTELLIGENCE AND PREDETERMINED DEVELOPMENT IS NO LONGER VALID. THE IMPORTANCE OF THE FINDING BY PIAGET THAT THE CHILD'S INTELLIGENCE IS QUALITATIVELY DIFFERENT FROM ADULT INTELLIGENCE IS PRESENTED. VARIOUS ABILITIES AND CONCEPTS ACQUIRED BY CHILDREN IN THE CHRONOLOGICALLY SUCCESSIVE STAGES OF DEVELOPMENT ARE DESCRIBED. THE AUTHORS ALSO COMMENT THAT PIAGET IS A UNIQUE AND IMPORTANT INDIVIDUAL WHOSE THEORIES SHOULD BE UNDERSTOOD AT LEAST MINIMALLY BY TEACHERS. (AL)

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AN INTRODUCTION TO JEAN PIAGET

by
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Jean Piaget is an uniquely important individual in modern psychology, especially for an educator interested in the development of children. Roger Brown (1965) calls Piaget's contribution second only to that of Sigmund Freud. Piaget is a Professor at the University of Geneva, Director of the International Bureau of Education, and Co-Director of the Institut Jean-Jacques Rousseau in Geneva, Switzerland. Sometimes his work and that of his associates is referred to as the "Geneva Approach."

For many years, Piaget's work was almost unknown to American psychologists, primarily it seems because of the lack of adequate translations into English of his elegant but difficult French. D.E. Berlyne was one of the earliest to recognize this inadequacy and to take positive action. Berlyne with Piercy (1950) translated Piaget's Psychology of intelligence, and spent the year 1958-59 with Piaget in Geneva. Berlyne's 1965 book, Structure and direction in thinking introduces a system of concepts to permit an integrative conceptualization of thinking. Berlyne draws upon behavior theory, in his book as well as the Geneva research and recent developments in Russian psychology.

As a result of such work as Berlyne's and others, the current influence of Piaget's research and writing can be discerned in the ideas of a host of important psychologists, including such diverse figures as D. P. Ausubel (1963) and J. S. Bruner (1965). Today

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most of his works are available to students, many in inexpensive paperback editions, such as Psychology of Intelligence, reviewed by Carson McGuire (1967) who says:

> Piaget views intelligence as a mental adaptation to new circumstances, both "accomodation" to stimuli from the environment and modification of the environment by imposing upon it a structure of its own, i.e., "assimilation." Thus intelligence as adaptation involves an equilibrium toward which the cognitive processes tend (the act of "equilibration"). The equilibration is between the action of the organism on the environment and vice versa. Remember that language is a partial substitute for action. Symbols,particularly those of mathematics (which are free of the deception of imagery), refer to an action which could be realized. When such symbols take the form of internalized actions they may be interpreted as operations of thought; i.e., an internal action translatable into behavior. Piaget relates affect and cognition--all behavior"implies an energizer or an 'economy' forming its affective aspect." The interaction with the environment which behavior instigates requires a form or structure to determine the possible circuits between subject and object--the cognitive aspect of behavior (schemata). Similarly, a perception . . ., sensory-motor learning (i.e. habit . . .) insight and judgment all amount, in one way or another, to a structuring of the relations between the environment and the organism.

Hunt (1961) identifies five main themes which he says dominate Piaget's theoretical formulations, namely: (1) the continual and progressive change in the structure of behavior and thought in the developing child; (2) the fixed nature of the order of the stages; (3) the invariant functions of accomodation (adaptive change to outer circumstances) and of assimilation (incorporation of the external into the inner organization with transfer or generalization to new circumstances) that operate in the child's continuous interaction with the environment; (4) the relation of thought to action; and (5) the logical properties of thought processes.

Roger Brown (1965) attributes to Piaget some 25 books and 160

articles, identifying the goal of the Geneva program as the discovery of the successive stages in the development of intelligence. Much current American research, such as that at the University of Chicago, reported by Fowler (1966) and Kohlberg (1966), lends strong support to the goals of Piaget's approach to the development of intelligence, while making an important clarification with their insistence that while the stages of Piaget are real and the sequence is constant, the "American misinterpretation" which attributes to time per se the status of a significant variable is to be denied. The prospective teacher should grasp this concept of sequence without the chains of time boundries, especially in view of the long-standing force in American psychology: the Gesellian interpretation of stages with firm upper and lower time limits. This maturationist view of fixed intelligence and predetermined development is no longer considered valid. Stages, as identified by Piaget, appear to occur in a constant, invariant sequence, but there are no time boundaries. To support this viewpoint, Smedslund (1961) and Wallach (1963) independently designed a program with the specific intention of accelerating a child's development. Both discovered that acceleration appeared to be successful only if the child was approaching readiness at the time of intensive intervention; otherwise it had no significant effect. Piaget (1953) indicated that this would be the case, saying: "When adults try to impose mathematical concepts on a child prematurely, his learning is merely verbal; true understanding of them comes only with his mental growth." Because many of the conceptions studied by Piaget seem resistant to change by training, there would seem to be a substantial readiness

factor involved, and probably readiness is at least partially a matter of massive experience (Brown, 1965) and readiness, like "stage" should not be linked to time per se.[1]

Piaget has hypothesized four distinct but chronologically successive models of intelligence, namely: (1) sensory motor; (2) pre-operational; (3) concretely operational; and (4) formally operational. Bruner (1964) in what seems to be a related concept concerning the development of intelligence identifies three stages, namely: (1) enactive; (2) iconic; and (3) symbolic. The Geneva research begins with some aspect of common adult knowledge. The method of inquiry is to ask questions; and data are the responses of the children. An example of this first method of research is reported in many of Piaget's early works such as Judgement and reasoning in the child (1928). A different approach was used primarily with his own children, when Piaget used as the starting point a set of performances; his method was naturalistic observation of infant behavior with experimental interventions. This second approach is demonstrated in The origins of intelligence in children (1936). The later Geneva studies began with systematic adult knowledge, asked questions and provided materials for manipulation; data included the manipulations and verbal responses of the children. In America

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1. At The University of Texas we prefer to use the term "development" instead of "growth" which is felt to be redundant. Development is understood to include: (1) increase in mass; (2) differentiation of parts; and (3) coordination of parts.
Rosenzweig (1966) in his research with brains of rats suggests that feedback from learning experiences influences development.

there is an increasing tendency to set up contrived experiences which parallel Piaget's research.

An important understanding brought out in the research and writings of Piaget and others (Kohlberg, 1966; Fowler, 1966; and Brown, 1965) is that typically the child's intelligence turns out to be qualitatively different from adult intelligence. As a result the child simply does not see nor understand things as an adult would.

Answers of children, which appear to be "incorrect" from an adult point of view are not viewed as ignorance. They are regarded as imperfect understandings of various intellectual matters. It is profoundly important that the imperfect responses are alike across a sample of children. Nevertheless, the order in which the stages succeed one another usually are constant. The word "usually" should be stressed since crosscultural research has not yet been carried out.

Piaget believes the child in the period of sensory-motor intelligence does not have internal representations of the world, even though he acts and percieves. With the development of imagery, the most primitive form of central representation (the beginning of the second stage), the sensory-motor period ends.

For the adult, an object has an identity which is preserved through various transformations by perceptual constancies, namely: size constancy, shape constancy, and color constancy. Other aspects of the object's invariant identity, regardless of changes of appearance, are dependent on knowledge of certain reversible operations, e.g. the adult does not suppose that a car is a different car because the rear does not have the appearance of the front. For

adults, disappearance from sight does not imply the cessation of existence, and objects are continuous in time and space. To an adult, an object retains its identity through changes of position and illumination, and exists outside the domain of personal experience, as Viet Nam exists even though we may not have been there.

Piaget holds that the adult's aspects of identity and perceptual constancies are learned, e.g. one of the most difficult things to understand about the infant's conception of an object is that he does not realize that it exists independently of himself. For example, during the period of sensory-motor intelligence, where the child is governed by his perceptions (what he touches, hears, particularly what he traces), he begins to develop the fundamental categories of experience and a conception of causality begins.

The first signs of imagery are a particular kind of imitation and play. Deferred imitation is imitation of an absent model, and Piaget postulates the existence of a central representation that guides the performance of the child. Imagery is also suggested by representational play; and it is imagery, according to Piaget, which makes the development of highly symbolic language possible.

Preoperational and concretely operational levels of intelligence are essentially two levels of response to a common array of tasks; the preoperational being (from an adult point of view) less adequate. Though the preoperational child uses language to identify things, ask questions, issue commands, and assert propositions, he does not distinguish between mental, physical, and social reality. He may believe that anything that moves is alive, such as a cloud, and will likely believe that a plant will feel a pin prick.

He may expect to command the inanimate and have it obey. To the preoperational child everything is originally made or created--all things are artifacts. The parents, as sources for everything, may serve as models who make and create things. Close-tied parental figures also may become models for the child's spontaneous conception of a diety. He sees the parents as infinitely knowing and powerful as well as eternal. The preoperational child is enslaved to his own viewpoint, completely unaware of other perspectives and thereby unaware of himself as a viewer. Things are just the way they are. They are unquestioned. This egocentrism is reflected in the child's difficulty in explaining verbally anything to another person. The egocentric child assumes his listener understands everything in advance.

The intelligence of the older child who has accumulated learning experiences is more adult-like in its separation of the mental and physical world. He grasps the points-of-view of others as well as relational concepts which tie objects and ideas together. The preoperational child has begun to develop the constancies (space, time, size, shape, color) necessary for survival (the child who cannot tell the difference perceptually between an oncoming auto a block away and one 10' away is not likely to survive) and to understand some of the underlying invariance behind the world of shifting appearances. Yet, to a large degree, he is still controlled by perception. Piaget believes that the preoperational child, despite his limitations from an adult viewpoint, operates with an intelligence that is of a different order from that of the concretely operational child, who depends less on perception. This dependence

on perception often leads the preoperational child to focus upon a single dimension of a problem. Compared to his elders, he is lacking in operations--the central events which do not imitate perception as does the image. Piaget believes that operations are derived from overt operations--interaction between the organism and environments (See McGuire review, Piaget, 1961). Piaget is convinced that intelligence develops out of motor activity, not just out of passive observation--the wider the range of the activity, the more diversified will be the intellectual operations of the developing child.

The concretely operational child can deal to a degree with potentiality as well as actuality to which the preoperational child is limited. The formally operational child approaches what is to Piaget the highest level of intelligence: the ability to represent, in advance of the actual problem, a full set of possibilities. The consequences of formally operational intelligence are identified as "characteristics of adolescence" by Brown (1965), who attributes to Piaget and Inhelder the belief that the reformism of the adolescent is a temporary return to egocentrism. Piaget and his associates acknowledge that adults in some "civilized" societies do not all attain formally operational intelligence. They assert and Brown supports the assertion that there are primitive societies in which no one attains formally operational intelligence.

Piaget finds evidence for his theories in the study of the games and the rules for games as children play them, since the understanding of rules appears to reflect the level of intelligence. The child who plays egocentrically holds the rules to be inviolable,

and may feel that they have always existed. In a transitional stage (late concrete operations) boys begin to play elaborately articulated social games. His observations of this stage caused Piaget to poke fun at educators who think children of this age are not capable of learning abstract subject matter. For this level of intelligence, a rule can be changed if consensus of the participants is obtained.

Another aspect of the Geneva studies (Piaget, 1948), the development of moral conceptions,begins with the understanding that adults judge naughtiness or wickedness on a basis of intentions, and can make independent judgments of seriousness as opposed or related to wickedness. In the preoperational child, however, most often naughtiness was judged in terms of perceived objective damage; on the other hand, older children judged naughtiness by the intentions of the offender. Similarly, studies of the child's conception of a lie seem to reflect the level of intellectual development. Young children said a lie was "naughty words" while older children believed a lie to be a statement not in accord with fact, for them reprehensibility is proportional to the variance between the falsehood and truth. Too great a departure became a joke instead of a lie, because no one would believe it. Much older children simply saw a lie as an untruth with the intent to deceive. Piaget asserts that in these developmental sequences a child's morality becomes increasingly inward, a process which Brown calls"enculturation" (1965, p. 241).

At the beginning of this profile of a man who is influencing education today, the writers stated that Piaget was a unique and

important individual whose theories at least minimally should be understood by the teacher. The range has been narrowed purposely, with only the goal of briefly introducing Piaget and a few of the multitude of ideas about children available from reports of the research conducted in Geneva. In a manner of speaking, this introduction is an hors d'oeuvre, deliberately tempting the teacher with the promise of an intellectual banquet as the reward for further personal inquiry and discovery.

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